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WARNING

Because of possible shock or fire hazards, connection of this instrument should be performed in compliance with the National Electric Code (ANSI C1) or any other requirements, or both, which may be applicable to the user.

Installation, operation, and maintenance should only be performed by qualified personnel.

TM-111200-1

VOLUME 1 -- OPERATING MANUAL

REMOTE MONITOR UNITS: 626-RMU-1, 626-RMU-3, 626-RMU-3A, 626-RMU-3H, 626-RMU-3AH

AND

REMOTE MONITOR INTERFACE ADAPTER: 626-PA-6036

NOTE: Refer to Volume 2 (Service Manual) of TM-111200 for maintenance data.

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DRANETZ TECHNOLOGIES, INC.
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Edison, NJ 08818

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IMPORTANT! CALIBRATION INTERVAL

The recommended calibration interval for this unit is once every 12 MONTHS.

We recommend that you return the unit to the factory for calibration. If you decide to do so, first contact the Dranetz Customer Service Department to obtain an authorization number.

Telephone Number:	(201) 287-3680
Telex Number:	499-7808
TWX Number:	(710) 997-9553
FAX Number:	(201) 248-9240
Cable:	DRANETZ

Then fill out the Repair/Service Order form enclosed in this manual and ship it along with the unit to the Dranetz Customer Service Department. (If this form is missing, ask the Dranetz Customer Service Department for a replacement.)

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ALL PRODUCTS OF DRANETZ TECHNOLOGIES, INC. ARE WARRANTED TO THE ORIGINAL PURCHASER AGAINST DEFECTIVE MATERIAL AND WORKMANSHIP FOR A PERIOD OF ONE YEAR FROM THE DATE OF DELIVERY. DRANETZ WILL REPAIR OR REPLACE, AT ITS OPTION, ALL DEFECTIVE EQUIPMENT RETURNED, FREIGHT PREPAID, DURING THE WARRANTY PERIOD, WITHOUT CHARGE FOR REPAIR, PROVIDED THERE IS NO EVIDENCE THAT THE EQUIPMENT HAS BEEN MISHANDLED OR ABUSED. THIS WARRANTY SHALL NOT APPLY TO ANY DEFECTS RESULTING FROM IMPROPER OR INADEQUATE MAINTENANCE, BUYER-SUPPLIED HARDWARE/SOFTWARE OR INTERFACING, UNAUTHORIZED MODIFICATION OR MISUSE OF THE EQUIPMENT, OPERATION OUTSIDE OF THE ENVIRONMENTAL SPECIFICATIONS FOR THE PRODUCT, OR IMPROPER SITE PREPARATION OR MAINTENANCE.

The information in this manual has been reviewed and is believed to be entirely reliable. No responsibility, however, is assumed for any inaccuracies. The material in this manual is for information purposes only, and is subject to change without notice.

Figure 1-1. Series 626 with 626-RMU-3

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VOLUME 1
OPERATOR'S MANUAL

REMOTE MONITOR UNITS 626-RMU-1, -3, -3A, -3H AND -3AH
AND 626-PA-6036 REMOTE MONITOR INTERFACE ADAPTER

SECTION I
GENERAL INFORMATION

1.1 SCOPE

This manual consists of two volumes. Volume 1, the Operator's Manual, is divided into three sections: I) GENERAL INFORMATION, II) INSTALLATION AND OPERATION, and III) OPERATIONAL TEST. Volume 2, the Service Manual, contains the maintenance instructions.

1.2 INTRODUCTION

This manual provides instructions for the operation of the 626-RMU Remote Monitor Units and the 626-PA-6036 Remote Monitor Interface Adapter plug-in used with the Series 626 Universal Disturbance Analyzer. (See fig. 1-1.) Since there are several models of the 626-RMU, the terms "Remote Monitor" and "RMU" will be used when describing features common to all versions. Familiarity with the 626 mainframe (as described in Volume 1 of the Mainframe manual) is assumed.

1.3 PURPOSE

The Remote Monitors are power line monitors designed for low cost, convenience of installation, and secure unattended operation. Each unit is a small, self-contained instrument capable of detecting various power line disturbances. The 626-PA-6036 plug-in allows the 626 to communicate with the RMU, using the 626 keyboard and printer for programming and data printout. Once programmed, the RMU may be disconnected from the 626 and left alone to monitor the desired power line. The RMU may be reconnected to a 626 at any time for data printout or reprogramming. The connection between the RMU and the 626 may be made with an interface cable or over telephone lines with optional modems. Various CRT and printing terminals may also be used to communicate with the RMU.

Events are categorized by type (sag, surge, etc.) and are retained in memory with time, date, amplitude, and duration (if applicable). Up to 10 events per category are recorded in detail. If there are more than 10 events in any one category, the 10 most severe will be maintained. Separate counters indicate total occurrences of each event type. Additionally, the RMU keeps a detailed list of up to 64 of the most recent events, including all categories. The RMU accumulates data until a CLEAR DATA command is given. Front panel LEDs light to indicate disturbance activity. Internal batteries preserve data and time for up to 1 month while being transported or during a power loss.

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1.3.1 626-RMU-1 (See Table 1-1 for specifications.)

The 626-RMU-1 (fig. 1-2) monitors single-phase 50-60 Hz AC power lines, recording changes in RMS level, high frequency impulses, and noise voltage between AC neutral and earth ground. Since it is powered from the source being monitored, an RMU-1 is installed by simply plugging it in and turning it on.

1.3.2 626-RMU-3 and -3H (See Table 1-1 for specifications.)

The 626-RMU-3 and -3H (fig. 1-3) monitor RMS level changes and impulses for 3-phase 50-60 Hz AC power lines plus a DC channel. Neutral-to-ground monitoring and line synchronization are referenced to phase A. Inputs are connected to screw terminals on a barrier block, with a separate power cord for the unit's supply.

1.3.3 626-RMU-3A and -3AH (See Table 1-1 for specifications.)

The 626-RMU-3A and -3AH are similar to an RMU-3 without a DC channel. Separate input terminals are provided for neutral-to-ground monitoring.

1.3.4 626-PA-6036

The 626-PA-6036 plug-in module provides a communication interface between the RMU and the Series 626 mainframe.

Table 1-1. Specification Summary

NOTE: Impulse accuracies are specified for a half-sine waveshape.

AC VOLTAGE INPUTS:

Range.....	RMU-3 and RMU-3A: 50-320 VRMS, 47-63 Hz RMU-1: 90-130 or 180-250 VRMS, 47-63 Hz RMU-3H and RMU-3AH: 50-600 VRMS, 47-63 Hz
Accuracy.....	±1% reading ±0.5% F.S.
Resolution.....	1 Volt
Input Impedance....	10 Megohms, 100 pF, each terminal to ground for RMU-1, -3, and -3A 20 Megohms , 50 pF each terminal to ground for RMU-3H and -3AH
Common Mode Voltage	Not to exceed 320 VRMS in addition to applied signal for RMU-1, -3, and -3A Not to exceed 600 VRMS in addition to applied signal for RMU-3H and RMU-3AH

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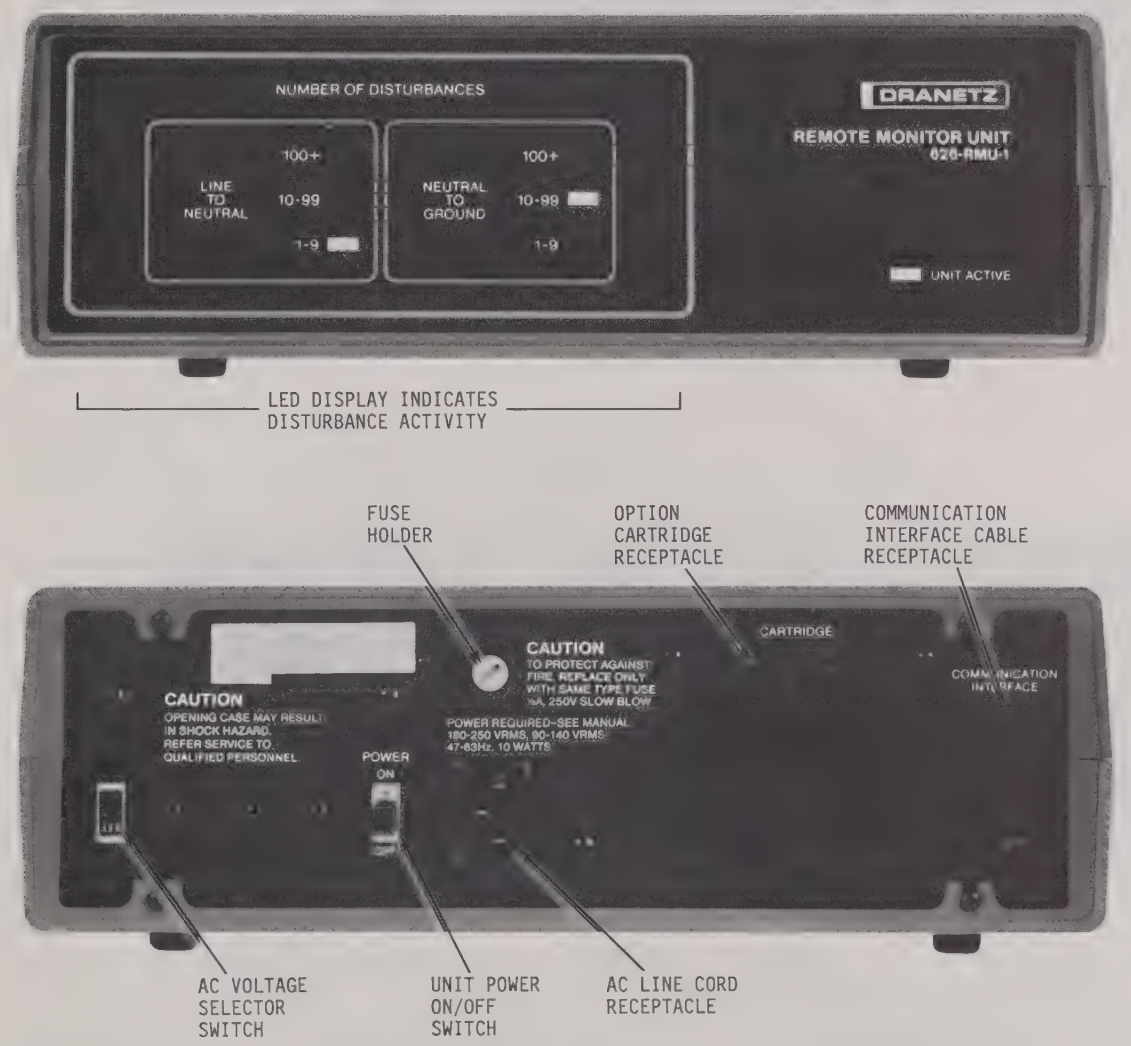

Figure 1-2. 626-RMU-1 Front and Rear Views

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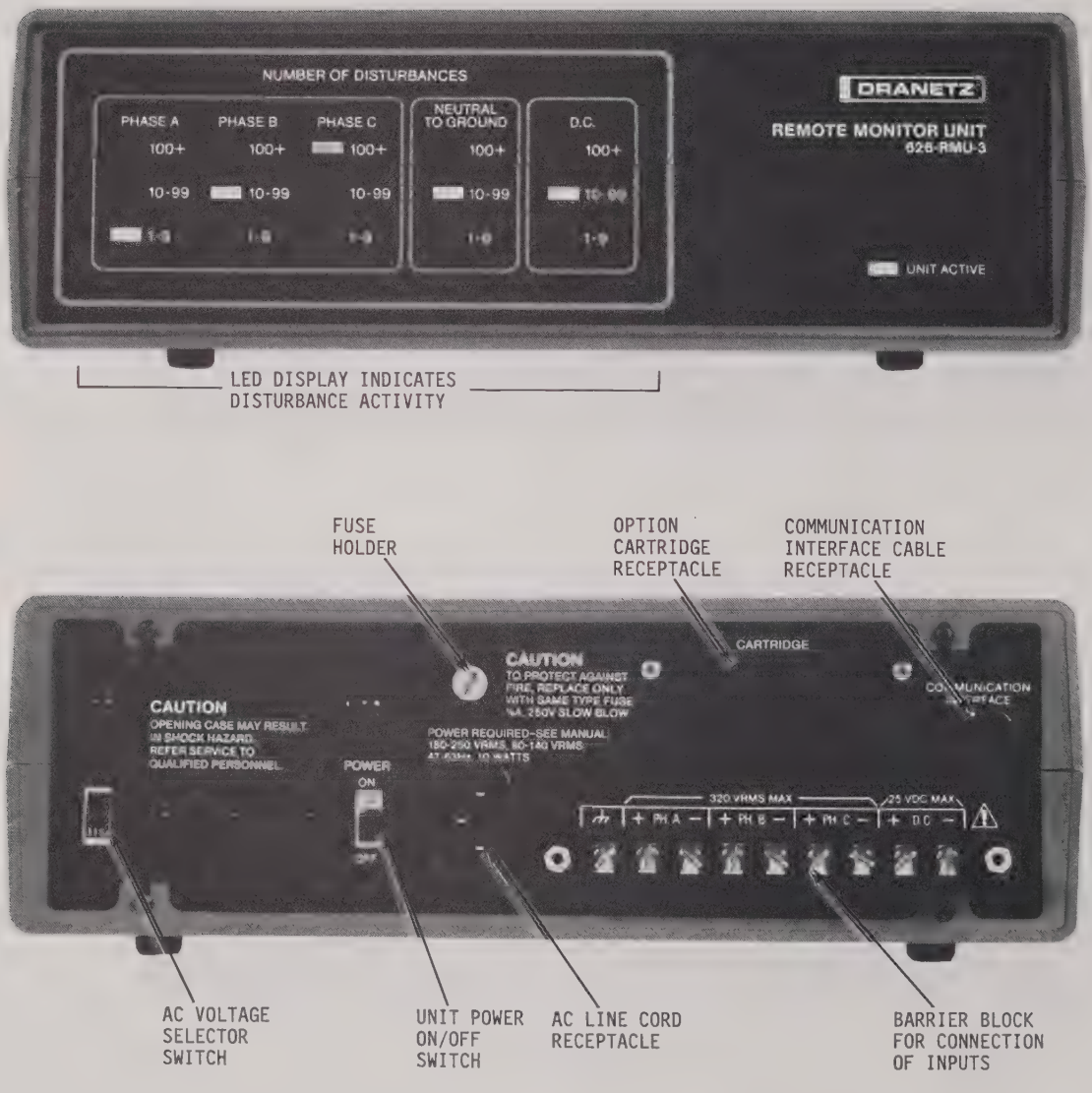

Figure 1-3. 626-RMU-3 Front and Rear Views

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Table 1-1. Specification Summary (Cont'd)

AC CHANNEL IMPULSE RESPONSE:

Range.....	50-2000 VPK, 1-1000 uS for RMU-1, -3, and -3A 100-4000 VPK, 1-1000 uS for RMU-3H and -3AH
Accuracy.....	±10% reading ±1% F.S., 5-50 uS -6dB @ 1uS & 1mS typ.
Resolution	2 Volts for RMU-1, -3, and -3A 4 Volts for RMU-3H and RMU-3AH

NEUTRAL PEAK MEASUREMENT:

Range.....	5-200 VPK, DC-250 KHz
Accuracy.....	±10% reading ±1% F.S., 0-100 KHz -6dB @ 250 KHz typ.
Resolution.....	1 Volt

DC VOLTAGE INPUT (RMU-3 and -3H only):

Range.....	1.0-25.0 VDC for RMU-3 1.0-99.0 VDC for RMU-3H
Accuracy.....	±3% reading ±0.5% F.S.
Resolution.....	0.1 Volt
Input Impedance....	10 Megohms, 100 pF, each terminal to ground for RMU-3 12 Megohms, 100 pF, each terminal to ground for RMU-3H
Common Mode Voltage	Not to exceed 25 VDC in addition to applied signal for RMU-3 Not to exceed 99 VDC in addition to applied signal for RMU-3H

DC CHANNEL IMPULSE (RMU-3 and -3H only):

Range.....	1.0-25.0 VPK, 1-100 uS for RMU-3 only 1.0-99.0 VPK, 1-1000 uS for RMU-3H
Accuracy.....	±10% reading ±1% F.S., 5-50 uS -6dB @ 1uS, 1mS typ.
Resolution.....	0.1 Volt

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Table 1-1. Specification Summary (Cont'd)

POWER SUPPLY:	
Voltage Range.....	90-130/180-250 VAC, switch selectable
Frequency Range....	47-63 Hz
Power Consumption..	20 Watts max.
Fuse Type.....	3/16 A, 250V, Slow Blow
INTERNAL BATTERIES:	
Battery Type.....	Rechargeable NiCd, not user replaceable
Charge Time.....	2 days from complete discharge to full charge. Internal, constant trickle-charge with unit on.
PHYSICAL:	
Size.....	4"(10 cm) high x 11"(28 cm) wide x 8"(20 cm) deep
Weight.....	6 lb (2.7 kg)
ENVIRONMENTAL:	
Temperature.....	+10 to +40 deg. C operating -40 to +55 deg. C storage
Humidity.....	0 to 95% non-condensing

1.4 APPLICATIONS

The RMU provides an efficient and cost effective means of evaluating power system performance at many sites without the need for highly trained personnel. Once the existence of a power problem has been verified with an RMU, a 626 may be used to provide more detail concerning impulse duration and direction as well as other environmental conditions such as temperature and humidity. Some typical applications for the RMU are:

a. To perform pre-installation site surveys. RMUs can be used to determine the adequacy of existing power lines intended to support critical electrical equipment. Anticipation of power problems saves time, money, and future trouble.

b. To determine the effect of power systems operation on equipment malfunction. The time-referenced disturbance record stored in the instrument permits rapid correlation of errors, outages, and equipment damage in computers, industrial process controls, medical monitoring equipment, and so forth, to power line faults.

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c. For ongoing maintenance. RMUs are inexpensive enough that they may be permanently installed in computer and industrial control systems. In the case of suspected intermittent power line problems, it would not be necessary to wait for problems to occur before correlations can be made, because the necessary disturbance information would already be stored by the RMU.

RMUs may be pre-programmed and stored at a central location or in field service vehicles and used as needed. Once installed, threshold and event data are secure, since there are no controls to be tampered with. If the unit is turned off, the occasion will be remembered as part of the unit history. (See para. 1.6.) After a monitoring session, the unit may be returned to a central office for data printout and reprogramming. If continuous monitoring of a site is desired, data may be retrieved in the meantime by swapping a freshly programmed unit with one that has been collecting data. Such a swap can be made in seconds with the 626-RMU-1 by simply turning off and unplugging one unit and then plugging in and turning on the fresh unit. Alternately, communication may be established either on-site or via telephone without disconnecting the RMU from the installation. The front panel LED display is also useful in determining the need for a data printout. (See par. 2.1.)

1.5 EVENT RECORDING CAPABILITY

By setting the programmable thresholds, the user defines the ranges over which power line conditions are considered acceptable. For AC voltage, the high and low limits define the normally expected input range. If line voltage leaves this range, a sag, surge, high, or low condition will be recognized. The impulse threshold is the smallest impulse peak which will be considered an event. A similar threshold applies to peak voltages between AC neutral and earth ground, indicating common mode noise. A Power Loss condition will be recorded if the RMU's power supply voltage falls below the minimum operating limit of either 90 or 180 VAC. (See para. 2.2.)

Three levels of detail are used to record events. A count is maintained of the number of events occurring in each category. If an event is among the ten most severe in its category, it will be recorded with time, date, amplitude, and duration (if applicable), and will remain stored in non-volatile memory until another more severe event takes place. If an event of any type is one of the last to have occurred, it will also appear in the sequential event list. Events in the sequential list are recorded with the same detail as for the worst-case events, but the exact order of events as they occur gives a better picture of exactly what happens in a chain of events.

The RMU-3 and -3H maintain 18 separate event categories in which a list of the 10 worst-case events are saved in memory. Including sequential storage, a total of up to 244 event records may be retained. For each of three phases of AC input, there are five categories: Sag, Surge,

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High, Low, and Impulse. Other categories include Neutral Peak, DC Average, and DC Impulse events. The RMU-1, -3AH and -3A process a subset of these. The following types of events are recognized by the RMU:

1.5.1 Sag

If line voltage falls below the programmed low limit but returns to normal within 2.55 seconds, a Sag has occurred. Worst-case and sequential Sag events are recorded with time, date, duration with 10mS resolution, and the lowest voltage level reached while out of limits.

1.5.2 Surge

If line voltage exceeds the high limit but returns to normal within 2.55 seconds, a Surge has occurred. Surges are recorded like Sags except that the amplitude represents the highest level reached while out of limits.

1.5.3 Low Line

A low event means that the line has been below the low limit for longer than 2.55 seconds. The event is recorded like a Sag except that duration has 1 second resolution.

1.5.4 High Line

This event is similar to a Low except that the high limit is exceeded. It is recorded like a Surge, but with 1 second resolution for the duration.

1.5.5 Impulse

Any high frequency impulse peak occurring during a cycle will be considered an event unless the amplitude involved is less than the programmed threshold. Worst-case and sequential Impulse events are recorded with time, date, and amplitude. No duration is measured.

1.5.6 Neutral

Neutral events are like Impulse events except that peaks are measured between AC neutral and earth ground rather than differentially. The neutral threshold is used the same way as the impulse threshold.

1.5.7 Power Loss

If the input to the RMU power supply becomes too low to operate the unit, a Power Loss condition results. This causes the unit to save the time and date of the power loss and shut itself off, relying on its

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internal batteries to maintain event memory and keep the time clock running. When power returns, the time and date are also recorded. The minimum allowable power supply voltage is determined by the selector switch on the rear panel. (See para. 2.2.) If this switch is set for 115V, a power loss will occur if the supply voltage falls below 90 VAC. For 230V operation, the power loss trip point is 180 VAC.

1.5.8 DC Average (RMU-3 only)

While there are four types of AC voltage level events, only one such category is defined for DC monitoring, simply indicating that the DC input voltage left the normal range. The most severe events are recorded with time and date, duration in seconds, and the most extreme voltage reached while out of limits. In other words, both "High" and "Low" events for DC are combined in the worst-case summary.

1.5.9 DC Impulse (RMU-3 only)

A separate threshold may be programmed for DC Impulse events, which are processed the same as AC Impulse events.

1.5.10 Sequential Events

Every disturbance is entered in the sequential event list in order of occurrence. Up to 64 of the most recent events are saved, including time and date changes. Sequential events are stored with the same detail as worst-case events. In addition, the AC and DC level events are more clearly defined. For example, a complete Sag event in the sequential list will begin with a "LOW" message, along with the time the line first went below the low limit. When the line returns to normal, the Sag event will be completed, as indicated by the printout. High and Low events also begin this way, but end with a "NORMAL" message. The phase letter also appears in sequential printouts, with the letter "D" indicating a DC event.

1.6 UNIT HISTORY

Along with disturbance data, an RMU summarizes activity concerning the unit itself. For example, if new thresholds are set, data is cleared, or the unit is shut off, the time and date of the occurrence are recorded. Up to 32 most recent unit history events are maintained, and cannot be erased by the user. This data is automatically cleared if memory is found to be invalid during a diagnostic test. Table 1-2 describes the various unit history entries.

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Table 1-2. RMU Unit History Events

Entry	Meaning
PWR ON	Power was either applied or restored to the unit's power supply.
PWR LOSS	Same as power loss as previously described.
PWR OFF	The ON/OFF switch was used to turn off the RMU
PROGRAM	The programming mode was entered. Thresholds may have been changed.
CLR DATA	All disturbance data has been erased.
TST ERR #	A diagnostic test has failed. The number indicates the failure code. (See para. 3.2.)

1.7 STANDARD ACCESSORIES (SHIPPED WITH ALL UNITS)

Model No.	Part No.	Quan.	Description
626-RMU- (All Models)	TM-111200, Vol 1	1	Operating Manual
	111346-G1	1	Interface Cable
	104943	1	AC line Cord

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1.8 OPTIONAL ACCESSORIES

Option	Description
DM-C15	PLUG-IN MODEM CARTRIDGE. May be used with any RMU. Direct-connect, 300 baud, fully duplex, FCC registered. RMU will automatically answer incoming calls. 25 ft. cord for RJ11 jack and manual (TM-111236) included.
P/N 111223	SHIPPING CONTAINER. Rugged, foam-lined briefcase style container. Holds one RMU of any type, cables, option cartridges, manual, and one 626-PA-6036.
Option 101 for 626-PA-6036	OPTIONAL MODEM. Adds telephone modem to 26-PA-6036. Direct-connect, 300 baud, fully duplex, FCC registered. Telephone number is automatically dialed after it is entered from the 626 front panel. All functions of basic 6036 are retained. Use of the interface cable will override the modem. Option must be ordered as part of 6036 and is not field retrofittable. 25 ft. cord for RJ11 jack and manual (TM-111236) included.
TM-111200, Vol. 2	Service (Maintenance) Manual.

1.9 FACTORY REPAIR

When factory repair is required, proceed as follows:

1. Contact Dranetz Customer Service Department to obtain an authorization number for factory repair:

   Telephone No: (201) 287-3680 TWX: (710) 997-9553

   FAX: (201) 248-9240 Telex: 499-7808

   Cable: DRANETZ

2. Fill out the REPAIR/SERVICE ORDER form enclosed in the Series 626 Operating manual. Ship it along with the malfunctioning equipment to the Dranetz Customer Service Department

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SECTION II
OPERATION

2.1 LED DISPLAY

The front panel LED display serves one of two functions, depending on whether or not the LED labelled "UNIT ACTIVE" is lit. If this LED is lit, the other LEDs indicate the amount of disturbance activity while monitoring. The LEDs are arranged in groups of three. Each group corresponds to one of the inputs being monitored. The RMU-1 has two groups, one for line-to-neutral AC voltage and the other for neutral-to-ground peak voltage. The RMU-3A and -3H have an LED group for each of three phases of AC in addition to neutral-to-ground. The RMU-3 and -3H have all the groupings of the RMU-3A plus one for the DC input. The numeric markings next to the LEDs indicate that the total number of events detected for that input falls within a certain range of values. A lit green LED means that between 1 and 9 events have been detected for the grouping as marked. From 10 to 99 events will light a yellow LED, and a red LED means that 100 or more disturbances have been processed. For example, a yellow LED lit in the PHASE A (LINE TO NEUTRAL for the RMU-1) group indicates a total of between 10 and 99 sags, surges, impulses, etc. detected for that phase.

When the RMU is turned on with the ON/OFF switch, the LEDs should flash for several seconds, then go dark. After several more seconds, the "UNIT ACTIVE" LED should light. This means that the RMU is functioning normally. If this LED does not come on, a diagnostic error code will be indicated by the LEDs in the PHASE A or LINE TO NEUTRAL group. The following section describes the meaning of the LEDs in this case.

2.2 POWER SUPPLY

WARNING

> The AC outlet used as a source of power for the unit MUST be properly grounded. Connection to an improperly grounded outlet or the use of an adapter preventing proper grounding may present a shock hazard and/or cause damage to the unit and equipment connected to the unit.

The RMU may be operated from either 115 VAC or 230 VAC (nominal). A 115V/230V switch selects the desired line voltage to be used to power the RMU. A 3/16-ampere fuse provides overload protection for either line voltage. An ON/OFF switch controls the application of power to the unit. The voltage selector switch, fuse, ON/OFF switch, and power cord receptacle are all located on the rear panel of the unit.

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2.2.1 AC Voltage Selection

When set for 115V nominal power line voltage, the RMU will function over a range of 90-130 VAC. When set for 230V, the allowable range is 180-250 VAC. To select the desired power line voltage, proceed as follows:

a. Turn off the power source being monitored, disconnect all measurement inputs, set the ON/OFF switch to OFF, and disconnect the power cord.

b. Using a small screwdriver or other suitable tool, set the 115V/230V switch to the desired position.

c. For 115V operation, install AC cord P/N 104943 between the unit and the 115V power source. This cord is supplied as a standard accessory to the unit. For 230V operation, AC cord P/N 110726 is recommended.

2.2.2 Replacement of Fuse

If no LEDs light on the front panel when power is applied to the unit, the fuse may need to be replaced. To replace the fuse, proceed as follows.

a. Turn off the power source being monitored, disconnect all measurement inputs, set the ON/OFF switch to OFF, and disconnect the power cord.

b. Using a small screwdriver or other suitable tool, turn the fuse retainer counterclockwise until it and the fuse are ejected from the fuse holder.

c. If the fuse is open, remove it from the retainer, discard it, and insert a replacement fuse in its place.

d. Reinstall by pressing in with the tool and turning clockwise. Use only a 3/16 ampere, 250V slow-blow fuse.

e. If the original fuse was intact, or if the replacement fuse opens, contact the Dranetz Service Corporation to determine if factory repair is needed.

2.3 COMMUNICATING WITH THE RMU

This section explains how to program the RMU and how to access the accumulated disturbance data during or after monitoring. The following discussion assumes the use of a Series 626 as the controlling device. All printout examples are as they would appear from a Series 626 thermal printer. The RMU is not guaranteed to work with devices other than the 626. However, it has been operated successfully with many different

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terminals, both CRT and printing type, using the standard interface cable. Information is provided to determine if a particular terminal will operate with the RMU.

2.3.1 Initial Power-up to RMU

Follow the instructions in paragraph 2.2.1 for proper AC voltage selection for the RMU power supply. Make sure the ON/OFF switch is OFF before connecting the power cord between the RMU and the power source outlet. Make sure the outlet is properly grounded. Turn the ON/OFF switch to ON. The LED display should flash as the RMU performs its diagnostic tests. If the LEDs do not flash, leave the unit on for 20-30 seconds, turn the ON/OFF switch OFF for 1 second, then turn it back on again. The LEDs should now flash as expected.

If this is the first time the RMU has been turned on, or if the batteries have been discharged, a diagnostic error is expected. Complete programming of the RMU followed by a diagnostic test will clear the error condition. The RMU should be left on for two days to ensure a full battery charge.

2.3.2 Using the 626-PA-6036 Plug-in Module

To install the 6036 in the Series 626 mainframe, first make sure the 626 is powered off. Slide the circuit board of the plug-in within the card-guide tracks of any module slot until firmly seated. Tighten the top and bottom captive screws to secure the rear panel of the plug-in to the 626 frame.

The 6036 is active only in the 626 PROGRAM mode with the appropriate channel selected. It has no function in the OPERATE mode except to identify itself for summaries and System Check. The plug-in may therefore be left installed in the 626 with no affect on the normal activity of other modules. The 6036 has a 626 module load rating of 1. Refer to the Series 626 Operator's Manual for the maximum allowable module load capacity of the 626 mainframe.

Turn on the 626 and select the PROGRAM mode for the channel in which the 6036 is installed. The RMU should also be turned on. Connect the "D" connector of the interface cable (supplied with the RMU) to the receptacle on the 6036 rear panel and attach the black audio connector to the socket on the rear panel of the RMU. A prompt for baud rate selection will be printed, and one yellow LED on the 626 front panel will light, indicating that a 1-digit entry is expected. Entries of 0, 1, or 2 will select 300, 1200, or 9600 baud, respectively. Other yellow keys will cause a reprint of the baud rate menu, and other color keys and buttons will be ignored. The RMU will identify itself, print the time and date and a program summary, and present a Main Menu of commands. One yellow LED on the 626 front panel will light, indicating that the RMU is ready to accept a command from the Main Menu. If using a device other than the 626 to communicate with the RMU, or if using external modems, continue with the following paragraph. If using a 626 as described above, proceed to paragraph 2.3.4.

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2.3.3 RMU Communcation Characteristics

This section completely describes the RMU communication characteristics. The following information is believed to be sufficient to enable a knowledgeable user to determine whether or not the RMU may be operated using a particular terminal device other than a Series 626. The term "terminal" will be used to refer to any terminal, computer, or modem used to communicate with the RMU.

2.3.3.1 Baud Rate Selection

Instead of having a user-selectable switch, the RMU has the ability to adjust itself to one of three baud rates. When the RMU senses that the interface cable has been connected, it uses the first character it receives as its baud rate reference. The RMU will adjust itself for 300, 1200, or 9600 baud, and remain at this rate until either an "end of session" command is received or the interface cable is disconnected. The exact procedure is as follows:

Set the terminal's baud rate for 300, 1200, or 9600 baud. Connect the interface cable to both the RMU and the terminal. If the RMU is not already powered on, turn it on using the ON/OFF switch on the rear panel and wait for the diagnostic sequence to finish. Type the "@" character and wait for this character to appear on the screen or paper of the terminal. The RMU will adjust its baud rate to match the terminal. When the "@" character appears, press the "RETURN" or "ENTER" key. The RMU will identify itself the same as described when using the 626, and will accept commands from the terminal keyboard. All output from the RMU may be read from the top down as it appears on the terminal screen or paper.

2.3.3.2 Series 626 Keyboard Simulation

The RMU will recognize certain characters from the terminal as equivalent to keys on the Series 626 front panel. Table 2-1 lists the 626 keys used to control the RMU and the corresponding ASCII characters generated by a terminal. The COLON/DECIMAL key on the 626 (marked as:.) is unique in that it is used to represent different characters at different times. When entering a number, it signifies a decimal point. When programming time and date, it is used as a colon and slash, respectively. The 626 always sends a period or decimal point to the RMU whenever this key is pressed. When using a terminal, the RMU may respond to one of several characters when it is expecting the equivalent of the COLON/DECIMAL key from the 626. More detail is provided in the following paragraphs.

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Table 2-1. Series 626 Front Panel Keys and ASCII Equivalents.

Series 626 Key	Terminal Character	ASCII (Hex.Byte)
ENTER	RETURN or ENTER	CR (ØD)
CLEAR ENTRY	Control-C	ETX (Ø3)
COLON/DECIMAL	colon, period, slash space	: (3A) . (2E) / (2F) SP (2Ø)
Ø-9	Numerals	Ø (3Ø) thru 9 (39)

2.3.3.3 RS-232C Characteristics

The RMU transmits and receives ASCII characters as serial data using RS-232C voltage levels. Characters are transmitted as 8-bit data words with no parity bit. This is equivalent to a 7-bit data word with "space" parity (parity bit always "Ø"). Two stop bits are transmitted. Received parity is ignored.

The interface socket on the rear panel of the RMU is not the usual 25-pin "D" connector. This helps prevent unwanted tampering. A cable is provided which does include the "D" connector. With this cable, the RMU is configured as DCE (Data Communication Equipment) for use with most data terminals. An adapter may be necessary with some computers and/or modems. Adapters and extension cables may be purchased from a variety of computer supply vendors. Extension cables longer than 5Ø feet are not recommended. Table 2-2 describes the pinouts of the RMU interface connector and the provided cable. Table 2-3 describes the pinouts at the 626-PA-6Ø36 "D" connector. Unlisted pins are not used.

Table 2-2. RMU Communcation Interface Connections.

Audio Conn. Pin No.	"D" Conn. Pin No.	Description RMU Function
1 --SHIELD--	1,7	RMU case ground
2 --WHITE---	3	Transmit serial data, output from RMU
3 --GREEN---	2	Receive serial data, input to RMU
4 --RED-----5,6,8		Valid CTS, DSR, DCD, output from RMU
5 --BLACK---	2Ø	DTR, input to RMU, must be valid

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Table 2-3. 626-PA-6036 Communication Interface Connections

Pin No.	Description
1,7	626 case ground
2	Transmit serial data, output to RMU
3	Receive serial data, input from RMU
4,20	Valid RTS, DTR, output to RMU
8	DCD, must be valid

2.3.3.4 Special Characters

The RMU is usually expecting a numeric digit, a carriage return, or a separator such as ":" or "/". Other characters will terminate the command in progress or repeat a menu prompt. The RMU will echo any character received, except for Control-S. (See para. 2.3.3.5). Normally, all characters output by the RMU are "printable" (letters, numbers, punctuation, etc.) plus the carriage return, line feed, and space characters.

2.3.3.5 Pause Control of RMU Output

When sending characters, the RMU ignores all input characters except Control-C and Control-S. If a Control-C is detected, output will stop and a menu prompt will be given. If a Control-S is received, the RMU will echo it and wait for another input character. If the next character received is Control-Q, the RMU will resume its output but will not echo the Control-Q. Any other character will terminate the operation. This is useful with CRT terminals, or when a computer is being used to read characters into a buffer.

If the pause/resume feature is used by a computer, there are several details that should be noted. After the decision has been made by the computer to send a Control-S, it will take time for the character to be sent to the RMU and more time for the RMU to echo. During this time, several other characters may be sent by the RMU. Also, it could be that as the Control-S is received, the RMU has already finished its output sequence and is expecting a valid command, in which case the Control-S would not be echoed. (See para. 2.3.3.4). Therefore, the following guidelines are provided:

1) After a Control-S is sent to the RMU, up to 5 characterss may be transmitted by the RMU before the echo of the Control-S.

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2) While waiting for the echo of Control-S, if more than 2 seconds elapses without receiving a character, it should be assumed that the RMU has already finished its operation and is waiting for a command. In this case, the contents of the buffer should be processed as usual, but instead of sending Control-Q, the program should prepare for the next command for the RMU.

2.3.3.6 Using Modems with the RMU

Optional direct-connect modems are available for both the 6Ø36 plug-in and the RMU, providing a complete auto-dial/auto-answer remote communication system. Other modems, both direct-connect and acoustic coupler, have been used with success, although the RMU is not guaranteed to work with other than Dranetz modems. In general, a male-to-male 25-pin "D" adapter is used with the RMU interface cable to convert the RMU from DCE to DTE. The 6Ø36 may be connected to most external modems using a standard male-to-female straight-through cable available from many computer supply vendors. Construction of the male-to-male adapter for the RMU is as follows:

	PIN #	CONNECT TO	PIN #	
	1	----------	1	
	2	----------	3	
TO MODEM	3	----------	2	----- RMU CABLE
	4,2Ø	----------	8	
	7	----------	7	
	8	----------	2Ø	

Instructions for the operation of the Dranetz modems are included with the purchase of the modems and are not repeated here. When using other modems, be sure to read the instructions carefully, making sure that all information regarding FCC rules and regulations is completely understood before using the modem.

2.3.4 Main Menu Selections

The Main Menu indicates the choice of functions available to the user. After the menu is printed, the RMU waits for the user to enter a single-digit number corresponding to the desired choice. The letter M will be printed as a record that the following choice will be from the Main Menu. The menu may be reprinted by selecting choice Ø. This section describes all Main Menu entries except for 5 and 6, which transfer control to other menus. (See paragraphs 2.3.5 and 2.3.6.) An example from a 626-RMU-3 follows.

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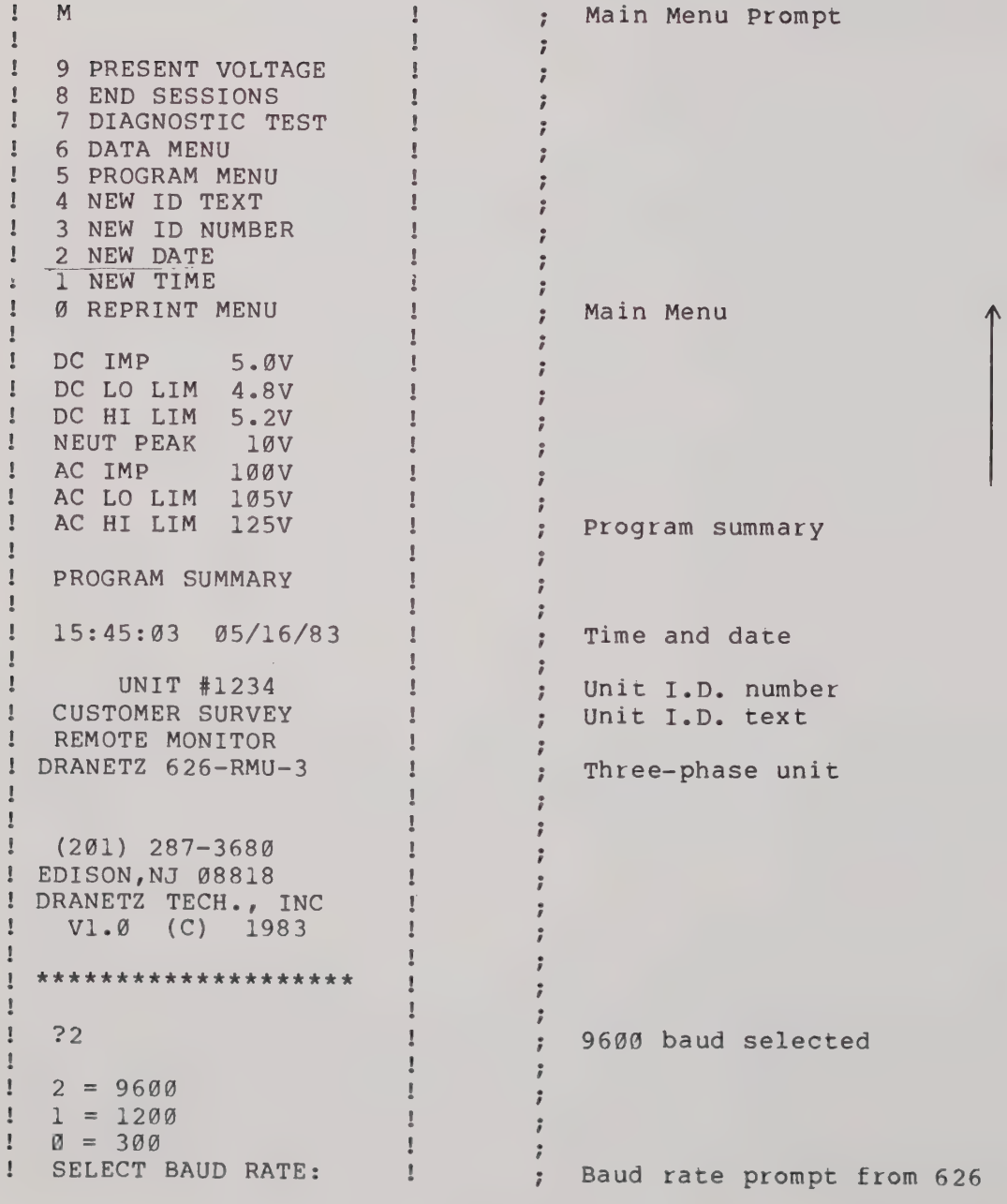
626


! M ! ; Main Menu Prompt
! 9 PRESENT VOLTAGE ! ;
! 8 END SESSIONS ! ;
! 7 DIAGNOSTIC TEST ! ;
! 6 DATA MENU ! ;
! 5 PROGRAM MENU ! ;
! 4 NEW ID TEXT ! ;
! 3 NEW ID NUMBER ! ;
! 2 NEW DATE ! ;
! 1 NEW TIME ! ;
! Ø REPRINT MENU ! ; Main Menu
! DC IMP 5.ØV ! ;
! DC LO LIM 4.8V ! ;
! DC HI LIM 5.2V ! ;
! NEUT PEAK 1ØV ! ;
! AC IMP 1ØØV ! ;
! AC LO LIM 1Ø5V ! ;
! AC HI LIM 125V ! ; Program summary
! PROGRAM SUMMARY ! ;
! 15:45:Ø3 Ø5/16/83 ! ; Time and date
! UNIT #1234 ! ; Unit I.D. number
! CUSTOMER SURVEY ! ; Unit I.D. text
! REMOTE MONITOR ! ;
! DRANETZ 626-RMU-3 ! ; Three-phase unit
! (2Ø1) 287-3680 ! ;
! EDISON,NJ Ø8818 ! ;
! DRANETZ TECH., INC ! ;
! V1.Ø (C) 1983 ! ;
! ********** ! ;
! ?2 ! ; 96ØØ baud selected
! 2 = 96ØØ ! ;
! 1 = 12ØØ ! ;
! Ø = 3ØØ ! ;
! SELECT BAUD RATE: ! ; Baud rate prompt from 626

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626A,G,R,ARA

```
!  SELECT BAUD RATE:      !        ;  Baud rate prompt from 626
!  Ø = 300                !        ;
!  1 = 1200               !        ;
!  2 = 9600               !        ;
!                         !        ;
!   ?2                    !        ;  9600 baud selected
!                         !        ;
!  ********************   !        ;
!                         !        ;
!    V1.Ø  (C)            !        ;
!  DRANETZ TECH., INC     !        ;
!  EDISON,NJ Ø8818        !        ;
!   (201) 287-3680Ø       !        ;
!                         !        ;
!                         !        ;
!  DRANETZ 626-RMU-3      !        ;  Three-phase unit
!   REMOTE MONITOR        !        ;
!   CUSTOMER SURVEY       !        ;  Unit I.D. text
!      ' UNIT #1234       !        ;  Unit I.D. number
!                         !        ;
!  15:45:Ø3  Ø5/16/83     !        ;  Time and date
!                         !        ;
!  PROGRAM SUMMARY        !        ;
!                         !        ;
!  AC HI LIM  125V        !        ;  Program summary
!  AC LO LIM  1Ø5V        !        ;
!  AC IMP     1ØØV        !        ;
!  NEUT PEAK   1ØV        !        ;
!  DC HI LIM   5.2V       !        ;
!  DC LO LIM   4.8V       !        ;
!  DC IMP      5.ØV       !        ;
!                         !        ;
!  Ø REPRINT MENU         !        ;  Main menu
!  1 NEW TIME             !        ;
!  2 NEW DATE             !        ;
!  3 NEW ID NUMBER        !        ;
!  4 NEW ID TEXT          !        ;
!  5 PROGRAM MENU         !        ;
!  6 DATA MENU            !        ;
!  7 DIAGNOSTIC TEST      !        ;
!  8 END SESSIONS         !        ;
!  9 PRESENT VOLTAGE      !        ;
!                         !        ;
!  M                      !        ;  Main Menu Prompt
```

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2.3.4.1 Setting Time and Date

Choices 1 and 2 allow the RMU's clock to be set to the current time and date. For time, the order of entry is hours, minutes, and seconds in a 24-hour format. Date is entered as month, day, and year. From the 626, the ":." key is used as a separator. From a terminal, a colon, period, slash ("/") or space may be used. When the entry is complete, the RMU will wait for "ENTER" or "RETURN" before actually setting the clock. Unexpected or aborted entries will return control to the Main Menu without changing the time or date. An example printout follows.

626

```
!                          !       ;
!  M                       !       ;
!                          !       ;
!  14:06:25  04/19/83      !       ;  Present time, new date
!                          !       ;
!                          !       ;
!  ? 04.19.83              !       ;  Date entry (period echoed as
!                          !       ;    separator)
!                          !       ;
!            MM/DD/YY      !       ;  Date entry expected format
!  14:06:03  04/18/83      !       ;  Present time and date
!                          !       ;
!                          !       ;
!2                         !       ;  Menu selection 2, DATE
! M                        !       ;
!                          !       ;
! 14:05:50   04/18/83      !       ;  New time, same date
!                          !       ;
!                          !       ;
! ?  14.05.50              !       ;  Time entry (2:05:50 PM)
!                          !       ;
!  HH:MM:SS                !       ;  Time entry expected format
!  14:01:12  04/18/83      !       ;  Present time and date
!                          !       ;
!1                         !       ;  Menu selection 1, TIME
!  M                       !       ;  Main Menu prompt
!                          !       ;
```


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626A,G,R,ARA

```
!                          !        ;
!  M                       !        ;  Main Menu prompt
!1                         !        ;  Menu selection 1, TIME
!                          !        ;
!  14:Ø1:12  Ø4/18/83      !        ;  Present time and date
!  HH:MM:SS                !        ;  Time entry expected format
!                          !        ;
!  ?   14.Ø5.5Ø            !        ;  Time entry (2:Ø5:5Ø PM)
!                          !        ;
!                          !        ;
!  14:Ø5:5Ø  Ø4/18/83      !        ;  New time, same date
!                          !        ;
!  M                       !        ;
!2                         !        ;  Menu selection 2, DATE
!                          !        ;
!                          !        ;
!  14:Ø6:Ø3  Ø4/18/83      !        ;  Present time and date
!            MM/DD/YY      !        ;  Date entry expected format
!                          !        ;
!  ? Ø4.19.83              !        ;  Date entry (period echoed
                                        as separator)
!                          !        ;
!                          !        ;
!  14:Ø6:25  Ø4/19/83      !        ;  Present time, new date
!                          !        ;
!  M                       !        ;
!                          !        ;
```

2.3.4.2 Unit Identifier

The RMU may be programmed with a 4-digit unit number and an 18-character identifier. Menu selection 3 is used to program a new unit number:

626

```
! M                        !        ;
!                          !        ;
!       UNIT #ØØØ7         !        ;  New number
!  ØØØ7                    !        ;  User entry
!       UNIT #ØØ12         !        ;  Present number
!3                         !        ;  Menu selection 3, ID NUMBER
```

626A,G,R,ARA

```
!3                         !        ;  Menu selection 3, ID NUMBER
!       UNIT #ØØ12         !        ;  Present number
!  ØØØ7                    !        ;  User entry
!       UNIT #ØØØ7         !        ;  New number
!                          !        ;
! M                        !        ;
```

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If a terminal is being used with the RMU, an 18 character text message may be programmed from the keyboard. If a 626 with 6036 plug-in is being used, a terminal must be connected to the 626's RS232 port and the REMOTE ONLY mode must be selected. This is done before interfacing to the RMU so that the terminal keyboard is used rather than the 626 front panel. Example:

626

```
! M                      !       ;
!                        !       ;
! CUST #50133 SURVEY     !       ;  New identifier
! CUST #50133 SURVEY     !       ;  User entry
!  CUSTOMER SURVEY       !       ;  Present identifier
!4                       !       ;  Menu selection 4, ID TEXT
```

626A,G,R,ARA

```
!4                       !       ;  Menu selection 4, ID TEXT
!  CUSTOMER SURVEY       !       ;  Present identifier
! CUST #50133 SURVEY     !       ;  User entry
! CUST #50133 SURVEY     !       ;  New identifier
!                        !       ;
! M                      !       ;
```

When the choice is made to change either identifier, the RMU erases the existing identifier. Therefore, to eliminate the unit identifier, select Main Menu entries 3 and 4 and follow each selection with CLEAR ENTRY.

2.3.4.3 End of Session

Menu selection 8 has the same effect as removing the interface cable from the RMU, but provides an orderly termination of communication by printing the time and date. A new baud rate may then be selected:

626

```
! 2 = 9600               !       ;
! 1 = 1200               !       ;
! 0 = 300                !       ;
! SELECT BAUD RATE:      !       ;  Baud rate prompt from 6036
!                        !       ;
! ******************     !       ;
! 16:01:22  05/16/83     !       ;  Time and date
!                        !       ;
!   END OF SESSION       !       ;  Message
!                        !       ;
!8                       !       ;
! M                      !       ;
```


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626A,G,R,ARA

```
! M                        !       ;
!8                         !       ;
!                          !       ;
!   END OF SESSION         !       ;  Message
!                          !       ;
! 16:01:22  05/16/83       !       ;  Time and date
! ******************       !       ;
!                          !       ;
! SELECT BAUD RATE:        !       ;  Baud rate prompt from 6036
! 0 = 300                  !       ;
! 1 = 1200                 !       ;
! 2 = 9600                 !       ;
```

2.3.4.4 Present Voltage

Menu selection 9 causes the RMU to print the present voltage at each of its inputs. For the RMU-1, this is the voltage appearing at its power cord. The RMU-3, -3H, -3AH, and RMU-3A print the voltage for each of three phases of AC, plus the present DC level if an RMU-3 or -3H. This feature is useful as a remote check that the monitoring installation is operating or simply as a spot-check of line voltage.

2.3.5 Programming Thresholds

Main Menu selection 5 causes another menu to be printed, showing the various programmable thresholds and their present values. Instead of "M", the letter "P" is used as a prompt. In this mode, selection 0 returns control to the Main Menu, selection 1 reprints the Programming Menu, and selection 2 sets all thresholds to factory preset values. Thresholds are changed by selecting the desired choice and entering a value. When using a Series 626, the front panel LEDs will indicate the number of expected digits and when to press "ENTER". When using a terminal, "ENTER" or "RETURN" is used to complete an entry. Pressing "CLEAR ENTRY" from the 626 or a non-numeric key from a terminal returns control to the Programming Menu without changing thresholds.

The AC thresholds for the RMU-3, -3H, -3AH and the RMU-3A apply to all phases. The RMU-1, -3AH and RMU-3A Programming Menus do not include DC parameters. Table 2-4 summarizes allowable ranges for programmable thresholds and their present values. After programming, it is recommended that event data be cleared and the diagnostic sequence be performed.

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626

```
!Ø                          !       ;  Return to Main Menu
! P                         !       ;
!                           !       ;
! AC HI LIM  130            !       ;  User enters 130
!3                          !       ;  Change AC high limit
! P                         !       ;
!                           !       ;
! AC IMP     Ø05Ø           !       ;  User enters Ø05Ø
!5                          !       ;  Change AC impulse threshold
! P                         !       ;
!                           !       ;
! 9 DC IMP          5.ØV    !       ;  DC parameters for
! 8 DC LO LIM       4.8V    !       ;  626-RMU-3 only
! 7 DC HI LIM       5.2V    !       ;
! 6 NEUT PEAK        1ØV    !       ;
! 5 AC IMP          1ØØV    !       ;
! 4 AC LO LIM       1Ø5V    !       ;
! 3 AC HI LIM       125V    !       ;  Programming Menu/Summary
! 2 PRESET                  !       ;
! 1 REPRINT MENU            !       ;
! Ø RET TO MAIN MENU        !       ;
!5                          !       ;  Selection 5, PROGRAM
!M                          !       ;  Start from Main Menu
```

626A,G,R,ARA

```
!M                          !       ;  Start from Main Menu
!5                          !       ;  Selection 5, PROGRAM
! Ø RET TO MAIN MENU        !       ;
! 1 REPRINT MENU            !       ;
! 2 PRESET                  !       ;
! 3 AC HI LIM       125V    !       ;  Programming Menu/Summary
! 4 AC LO LIM       1Ø5V    !       ;
! 5 AC IMP          1ØØV    !       ;
! 6 NEUT PEAK        1ØV    !       ;
! 7 DC HI LIM       5.2V    !       ;
! 8 DC LO LIM       4.8V    !       ;  626-RMU-3 only
! 9 DC IMP          5.ØV    !       ;  DC parameters for
!                           !       ;
! P                         !       ;
!5                          !       ;  Change AC impulse threshold
! AC IMP    Ø05Ø            !       ;  User enters Ø05Ø
!                           !       ;
! P                         !       ;
!3                          !       ;  Change AC high limit
!  AC HI LIM  13Ø           !       ;  User enters 13Ø
!                           !       ;
! P                         !       ;
!Ø                          !       ;  Return to Main Menu
```


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Table 2-4. Allowable Ranges of Programmable Thresholds.

Parameter	Min	Max (RMU-1,-3,-3A)	Max (RMU-3H,3AH)	Preset
AC HIGH LIMIT	51	320	660*	125
AC LOW LIMIT	50	319	659	105
AC IMPULSE	50	2000	4000	100
NEUTRAL PEAK	005	205	205	010
DC HIGH LIMIT	1.1	25.0	99.0	5.2
DC LOW LIMIT	1.0	24.9	98.9	4.8
DC IMPULSE	1.0	25.0	99.0	5.0

*Even though the AC HIGH LIMITs of the RMU-3H and -3AH are programmable to 660 VRMS, their maximum inputs are 600 VRMS.

2.3.6 Data Printouts

Master Menu selection 6 causes a Data Menu to be printed, with choices allowing stored data to be examined or erased. From this menu, selection 0 returns control to the Master Menu, selection 1 reprints the Data Menu, and selection 2 allows event data to be erased. When this mode is first entered, the unit identifier, time, date, and monitoring period dates are printed. The monitoring period dates are the first and last days of active monitoring. The starting date resets when data is cleared. The ending date is updated daily.

It should be noted that printing of stored data does not remove the data from the RMU. Disturbance data is cleared only by direct command. The CLEAR DATA switch position on the 626 has no affect on the RMUs. Also, communicating with the RMU does not affect its monitoring. The RMU has no separate OPERATE and PROGRAM modes, as it can monitor and respond to commands simultaneously.

Most data processed by the RMU is kept as a list of the ten most severe disturbances in various categories. Each category is identified by phase (if applicable), type of disturbance (sag, etc.), and the number of occurrences of that type of event. Each worst-case event is described on one line, showing amplitude, duration (if applicable), and time of day. Events occurring on the same day are grouped together after the date is printed. The result is two or three columns of data under the headings of VOLTS for amplitude, SEC for duration (if applicable) and TIME for time of day. In the following example, the monitoring period was from April 5 to April 6. The user chose to look at the worst-case summaries for phase A, then the sequential events. After the data printouts, the stored events were erased, preparing the unit for another monitoring session.

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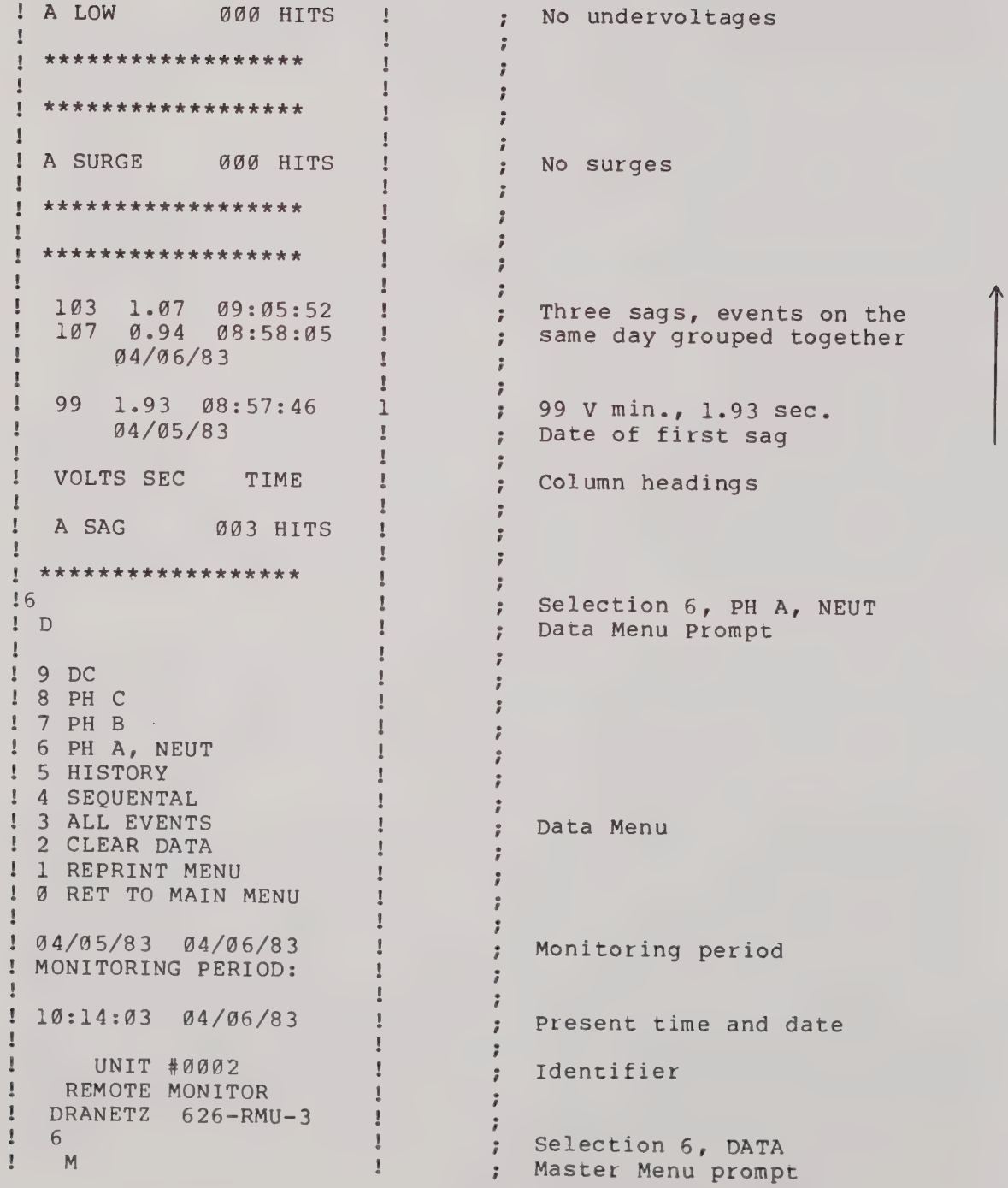

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626

```
!  A HIGH     23:01:21     !        ;  Overvoltage sequence
!                          !        ;
!     253V PK              !        ;
!  A IMP      08:57:48     !        ;  Example of AC impulse event
!                          !        ;
!     99V MIN    1.93S     !        ;  Sag duration < 2.56 seconds
!  A NORMAL   08:57:46     !        ;  Return to normal
!                          !        ;
!  A LOW      08:57:44     !        ;  Sag sequence begins with LOW
!                          !        ;
!  PWR ON     07:32:38     !        ;
!                          !        ;
!  04/05/83                !        ;  First day of monitoring
!                          !        ;
!  SEQUENTIAL EVENTS       !        ;
! ******************       !        ;
!4                          !        ;  Selection 4, SEQUENTIAL
! D                        !        ;
! ******************       !        ;
!                          !        ;
!  NEUTRAL    000 HITS     !        ;  No neutral events
!                          !        ;
! ******************       !        ;
!                          !        ;
! ******************       !        ;
!                          !        ;
!  253       08:57:48     !        ;  One impulse event
!      04/05/83            !        ;
!                          !        ;
! VOLTS          TIME      !        ;
!                          !        ;
! A IMP       001 HITS     !        ;
!                          !        ;
! ******************       !        ;
!                          !        ;
! ******************       !        ;
!                          !        ;
!  132  07  23:01:28       !        ;  One overvoltage event
!      04/05/83            !        ;
!                          !        ;
! VOLTS SEC      TIME      !        ;
!                          !        ;
! A HIGH       001 HITS     !        ;
!                          !        ;
! ******************       !        ;
!                          !        ;
! ******************       !        ;
```

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626

```
!Ø                          !       ;  Return to master menu
! D                         !       ;
!1                          !       ;  User responds "yes"
!  ?                        !       ;  data is now cleared
!                           !       ;
!                           !       ;
!  (1=YES Ø=NO)             !       ;
!  ARE YOU SURE?            !       ;  User asked for confirmation
!2                          !       ;  Selection 2, CLEAR DATA
!D                          !       ;
!                           !       ;
!  ******************       !       ;
!                           !       ;
!                           !       ;
!     13.2V PK              !       ;
!  D IMP      Ø9:14:43      !       ;  Example of DC impulse event
!                           !       ;
!     1Ø3V MIN  1.Ø7S       !       ;
!  A NORMAL   Ø9:Ø5:52      !       ;
!                           !       ;
!  A LOW      Ø9:Ø5:51      !       ;  Another sag
!                           !       ;
!     1Ø7V MIN   Ø.94S      !       ;
!  A NORMAL   Ø8:58:Ø6      !       ;
!                           !       ;
!  A LOW      Ø8:58:Ø5      !       ;  Another sag sequence
!                           !       ;
!          Ø4/Ø6/83         !       ;  Second day of monitoring
!                           !       ;
!     132V MAX  ØØ7S        !       ;
!  A NORMAL   23:Ø1:28      !       ;
```


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626A,G,R,ARA

```
!  M                        !       ;  Master Menu prompt
! 6                         !       ;  Selection 6, DATA
! DRANETZ  626-RMU-3        !       ;
!  REMOTE MONITOR           !       ;
!    UNIT #0002             !       ;  Identifier
!                           !       ;
! 10:14:03  04/06/83        !       ;  Present time and date
!                           !       ;
! MONITORING PERIOD:        !       ;
! 04/05/83  04/06/83        !       ;  Monitoring period
!                           !       ;
! 0 RET TO MAIN MENU        !       ;
! 1 REPRINT MENU            !       ;
! 2 CLEAR DATA              !       ;
! 3 ALL EVENTS              !       ;  Data Menu
! 4 SEQUENTIAL              !       ;
! 5 HISTORY                 !       ;
! 6 PH A, NEUT              !       ;
! 7 PH B                    !       ;
! 8 PH C                    !       ;
! 9 DC                      !       ;
!                           !       ;
! D                         !       ;  Data Menu prompt
!6                          !       ;  Selection 6, PH A, NEUT
! ******************        !       ;
!                           !       ;
!  A SAG       003 HITS     !       ;
!                           !       ;
!  VOLTS SEC    TIME         !       ;  Column headings
!                           !       ;
!       04/05/83            !       ;  Date of first sag
!  99   1.93  08:57:46       !       ;  99 V min., 1.93 sec.
!                           !       ;
!       04/06/83            !       ;
!  107  0.94  08:58:05       !       ;  Three sags, events on the
!  103  1.07  09:05:52       !       ;  same day grouped together
!                           !       ;
! ******************        !       ;
!                           !       ;
! ******************        !       ;
!                           !       ;
! A SURGE      000 HITS      !       ;  No surges
!                           !       ;
! ******************        !       ;
!                           !       ;
! ******************        !       ;
!                           !       ;
! A LOW        000 HITS      !       ;  No undervoltages
```

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626A,G,R,ARA

```
! ******************     !       ;
!                        !       ;
! ******************     !       ;
!                        !       ;
! A HIGH       ØØ1 HITS  !       ;
!                        !       ;
! VOLTS SEC      TIME     !       ;
!                        !       ;
!      Ø4/Ø5/83          !       ;
!  132  Ø7  23:Ø1:28     !       ;  One overvoltage event
!                        !       ;
! ******************     !       ;
!                        !       ;
! ******************     !       ;
!                        !       ;
!  A IMP      ØØ1 HITS    !       ;
!                        !       ;
!  VOLTS         TIME     !       ;
!                        !       ;
!      Ø4/Ø5/83          !       ;
!  253       Ø8:57:48     !       ;  One impulse event
!                        !       ;
! ******************     !       ;
!                        !       ;
! ******************     !       ;
!                        !       ;
!  NEUTRAL     ØØØ HITS   !       ;  No neutral events
!                        !       ;
! ******************     !       ;
! D                      !       ;
!4                       !       ;  Selection 4, SEQUENTIAL
! ******************     !       ;
!  SEQUENTIAL EVENTS      !       ;
!                        !       ;
!        Ø4/Ø5/83        !       ;  First day of monitoring
!                        !       ;
!  PWR ON      Ø7:32:38   !       ;
!                        !       ;
!  A LOW       Ø8:57:44   !       ;  Sag sequence begins with LOW
!                        !       ;
!  A NORMAL    Ø8:57:46   !       ;  Return to normal
!     99V MIN    1.93S    !       ;  Sag duration < 2.56 seconds
!                        !       ;
!  A IMP       Ø8:57:48   !       ;  Example of AC impulse event
!        253V PK          !       ;
!                         !       ;
!                         !       ;
!  A HIGH      23:Ø1:21   !       ;  Overvoltage sequence
!                         !       ;
!  A NORMAL    23:1Ø:28   !       ;
!       132V MAX  ØØ7S    !       ;
!                         !       ;
!         Ø4/Ø6/83        !       ;  Second day of monitoring
!                         !       ;
```


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```
!  A LOW       08:58:05   !       ;  Another sag sequence
!                         !       ;
!  A NORMAL    08:58:06   !       ;
!     107V MIN  0.94S     !       ;
!                         !       ;
!  A LOW       09:05:51   !       ;  Another sag
!                         !       ;
!  A NORMAL    09:05:52   !       ;
!    103V MIN  1.07S      !       ;
!                         !       ;
!  D IMP       09:14:43   !       ;  Example of DC impulse event
!    13.2V  PK            !       ;
!                         !       ;
!                         !       ;
! ******************      !       ;
!                         !       ;
!D                        !       ;
!2                        !       ;  Selection 2, CLEAR DATA
!  ARE YOU SURE?          !       ;  User asked for confirmation
!  (1=YES 0=NO)           !       ;
!                         !       ;
!                         !       ;
!   ?                     !       ;  User responds "yes",
!1                        !       ;  data is now cleared.
! D                       !       ;
!0                        !       ;  Return to master menu
```

2.4 CONNECTION OF MONITORED INPUTS

Input connections and disconnections should be made only when the Remote Monitor ON/OFF switch is OFF. For the RMU-1, simply plug the unit's power cord into the outlet to be monitored and turn on the Remote Monitor. Refer to figure 2-1 for three-phase input connections. Note that for a "delta" configuration there is no neutral as such, so the neutral threshold should be set to 205V to avoid unwanted data printouts. Also, be sure to replace the barrier block protective cover before energizing the input signals.

All units will, as mentioned, record a power loss if the power supply voltage falls below either 90 or 180 VAC, depending on the position of the selector switch on the rear panel. The RMU-3, -3H, -3AH and RMU-3A will sample inputs at a 50 Hz rate if the AC on phase A should drop out, ensuring continuous monitoring of impulses, neutral-to-ground, etc.

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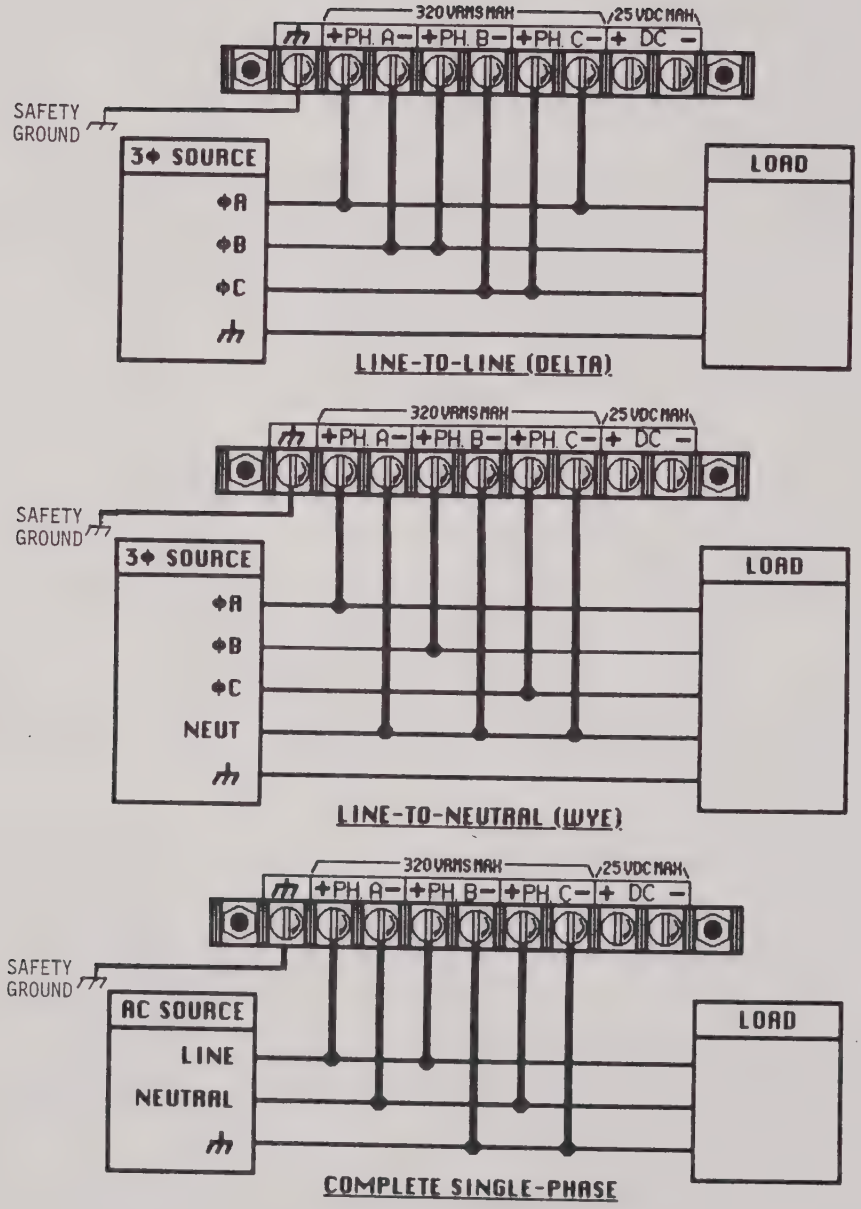

Figure 2-1. 626-RMU-3 and -3H AC Input Connections

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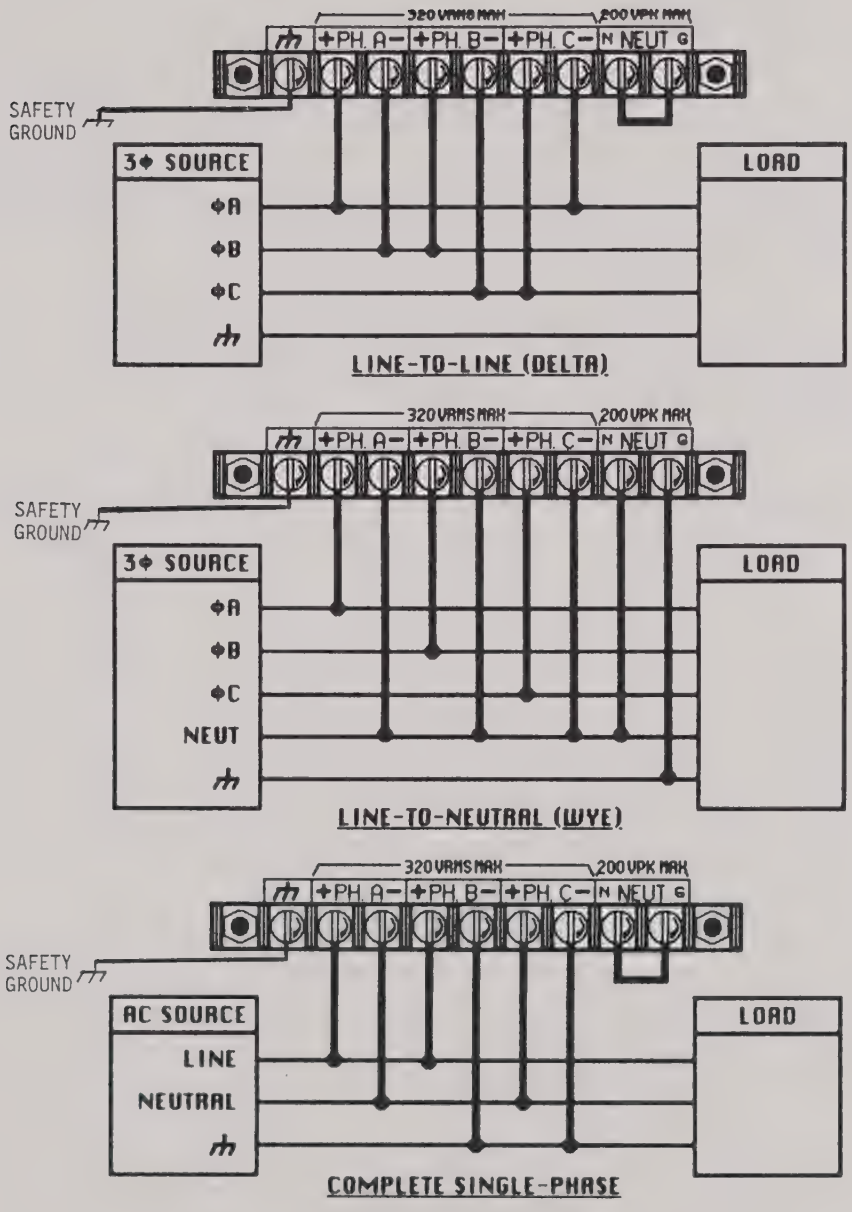

Figure 2-2. 626-RMU-3A and -3AH AC Input Connections

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2.5 INTERNAL BATTERIES

The RMU is equipped with internal batteries to maintain data and keep the time clock running while turned off or during a power loss. As long as the RMU is powered on, the batteries are being trickle-charged. Fully charged batteries will maintain data and time for one month, typically. If the batteries become severely depleted, as evidenced by diagnostic errors (see para. 3.2), the unit should be left on for two days to ensure a full charge.

The batteries are permanently installed in the RMU and cannot be accessed by the user. Replacement may be necessary after 2 to 3 years of operation. If it seems that the batteries are not holding a charge, the unit should be returned to the factory.

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SECTION III
OPERATIONAL TESTS

3.1 GENERAL

This section provides information for performing operational tests to verify that the RMU is operating properly.

3.2 DIAGNOSTICS

When power is applied or restored to the RMU, or upon user command, various tests are performed by the unit to check hardware and data integrity. The front panel LEDs are cycled to make sure they all light. Read/write memory (RAM) is tested for proper operation, and battery powered RAM is checked for expected data patterns. The time update interval is verified, and time and date data are checked for validity. The analog-to-digital converter is tested for specified conversion time. User-programmed thresholds are compared against the minimum and maximum allowable values.

If a test is failed, the "Unit Active" LED will be off and a code will be indicated by the PHASE A (RMU-3, -3H, -3AH, and RMU-3A) or LINE TO NEUTRAL (RMU-1) group of LEDs. If the diagnostic routine was user-initiated, a printed response will reflect the code shown by the LEDs. If there were no failures, the user-initiated response will be "DIAGNOSTIC CODE 0", and the LEDs will resume their normal function with the "Unit Active" LED lit. In the case of multiple failures, the LEDs and the printed response, if any, will indicate the last failure encountered. All failures are retained as part of unit history. Table 3-1 describes the failure codes and possible remedies. If a hardware failure is indicated, refer to paragraph 1.9 for factory repair instructions. Any diagnostic failure inhibits monitoring activity, causing the RMU to wait until the problem is resolved. When used as recommended, no failures are, of course, anticipated. If the batteries become discharged, however, the unit will fail to find expected data in memory, and time, date, threshold, and unit identifier will all be invalid. Unit history will be cleared. Recovery from this situation involves reprogramming the invalid parameters and clearing the event data.

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Table 3-1. Diagnostic Codes.

Code Number	LEDs GRN	YEL	RED	Description
1	OFF	OFF	ON	(Not used)
2	OFF	ON	OFF	Expected data not found. Possible discharged battery, confirmed by error numbers 4 and 7. Reprogram all parameters and clear event data.
3	OFF	ON	ON	RAM test failure. Bad memory and/or clock ICs.
4	ON	OFF	OFF	Time and/or date invalid. Reprogram.
5	ON	OFF	ON	Wrong time update interval. Program time and retest. Bad clock IC if second failure.
6	ON	ON	OFF	A/D convertor did not respond as expected. Bad IC.
7	ON	ON	ON	Invalid threshold data. Reprogram.

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APPENDIX A

THE ARC-20 ALARM RELAY CARTRIDGE OPTION

A.1 GENERAL

This appendix contains information regarding the optional ARC-20 Alarm Relay Cartridge (versions G1 and G2).

A.2 DESCRIPTION

The ARC-20 is housed in a small plastic cartridge and interfaces with any RMU via its cartridge slot. While in operation, the Alarm cartridge will activate both of its internal relays when an event is detected by the RMU, and when the RMU is turned on. One relay has a prescribed delay time (one second for the G1, and five seconds for the G2), while the other is a latching relay. An external alarm is connected to either of these relays via a barrier block located on the rear of the cartridge. The contact for an external, momentary reset switch to be used with the latching relay is also accessible via the barrier block.

A.3 TECHNICAL SPECIFICATIONS

Relay Input Ratings:

Voltage.....20Vdc (max)
Current.....1 amp

Minimum Operations.....10^6

Contact Duration:

Non-latched Relay.....1 second (G1)
5 seconds (G2)

Latched Relay.....Continuous [Resettable by an external switch closure]

Relay Outputs:

User selectable as Normally Open....(NO)
or Normally Closed..(NC)

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A.4 INSTALLATION OF THE ARC-20 IN THE RMU

CAUTION

Insertion or removal of the ARC-20 cartridge while the RMU is on may cause damage to both pieces of equipment.

To install the ARC-20 Alarm Relay Cartridge in an RMU, proceed as follows:

1) Turn the ON/OFF switch on the RMU rear panel to "OFF".

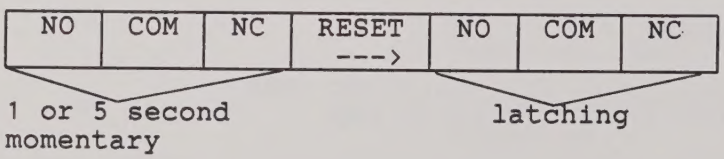
2) Insert the ARC-20 into the cartridge receptacle on the RMU rear panel. When fully inserted, the cartridge will protrude slightly less than 1 inch from the panel.

3) Turn the ON/OFF switch on the RMU rear panel to "ON".

To remove the ARC-20 alarm cartridge from an RMU, reverse the above procedure.

A.5 EXTERNAL CONNECTIONS

All external connections to the ARC-20 are made through the barrier block on the rear of the cartridge as shown below:



NO------ Normally Open outputs of each of the respective internal relays.

COM----- COMmon inputs for which a DC voltage source of 5 to 20 volts are to be connected.

NC------ Normally Closed outputs of each of the respective internal relays.

RESET--- Inputs for a momentary switch in order to RESET the latching relay, denoted by the direction of the arrow.

MP MASTER
MA23104

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